

FORM-PTO-1390  
(Rev. 5-93)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

0145-152

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5)

09 / 530955

INTERNATIONAL APPLICATION NO.  
PCT/JP99/05542INTERNATIONAL FILING DATE  
OCTOBER 7, 1999PRIORITY DATE CLAIMED  
NONE

TITLE OF INVENTION

ULTRAVIOLET ILLUMINATION EQUIPMENT

APPLICANT(S) FOR DO/EO/US

Nobuyuki HISHINUMA, Hiroshi SUGAWARA, Fumitosho TAKEMOTO, Hiroaki TOKAI and Jun MURASE

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
  2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
  3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and the PCT Articles 22 and 39(1).
  4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
  5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
    - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
    - b. ☒ has been transmitted by the International Bureau.
    - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
  6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
  7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
    - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
    - b. ☐ have been transmitted by the International Bureau.
    - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
    - d. ☐ have not been made and will not be made.
  8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
  9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
  10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).
- Items 11. to 16. below concern other document(s) or information included:**
11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98
  12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
  13. ☒ A FIRST preliminary amendment.  
☐ A SECOND or SUBSEQUENT preliminary amendment
  14. ☐ A substitute specification.
  15. ☐ A change of power of attorney and/or address letter.
  16. ☒ Other items or information: PATENT APPLICATION BIBLIOGRAPHIC DATA AND FIVE (5) SHEETS OF DRAWINGS (FIGS. 1-5)

422 Rec'd PCT/PTO 1 6 MAY 2000

U.S. APPLICATION NO. (If known, see 37 CFR 1.50)

09/530955

INTERNATIONAL APPLICATION NO  
PCT/JP99/05542ATTORNEY'S DOCKET NUMBER  
0145-15217. ☒ The following fees are submitted:

CALCULATIONS

PTO USE ONLY

**Basic National Fee (37 CFR 1.492(a)(1)-(5)):**

Search Report has been prepared by the EPO or JPO ..... \$840.00

International preliminary examination fee paid to USPTO (37 CFR 1.482) ..... \$670.00

No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) ..... \$760.00

Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$970.00

International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) ..... \$ 96.00

**ENTER APPROPRIATE BASIC FEE AMOUNT =**

\$ 840.00

Surcharge of **\$130.00** for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492(e)).

☐ 20 ☐ 30

\$ 0

Claims

Number Filed

Number Extra

Rate

Total Claims

10 -20 =

0

X \$18.00

\$ 0

Independent Claims

2 -3 =

0

X \$78.00

\$ 0

Multiple dependent claim(s) (if applicable)

+ \$260.00

\$ 0

**TOTAL OF ABOVE CALCULATIONS =**

\$ 840.00

Reduction for 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).

\$ 0

**SUBTOTAL =**

\$ 840.00

Processing fee of **\$130.00** for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492(f)).

☐ 20 ☐ 30

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+

**TOTAL NATIONAL FEE =**

\$ 840.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +

\$ 40.00

**TOTAL FEES ENCLOSED =**

\$ 880.00

Amount to be:  
refunded

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charged

\$

a. ☒ A check in the amount of \$ 880.00 to cover the above fees is enclosed.b. ☐ Please charge my Deposit Account No. 19-2380 in the amount of \$ to cover the above fees. A duplicate copy of this sheet is enclosed.c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 19-2380(0145-152). A duplicate copy of this sheet is enclosed.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO:

David S. Safran, Esq.  
NIXON PEABODY LLP  
8180 Greensboro Drive  
Suite 800  
McLean, Virginia 22102

SIGNATURE

David S. Safran  
NAME

27,997  
REGISTRATION NUMBER

IN THE UNITED STATES DESIGNATED/ELECTED OFFICE

IN RE INTERNATIONAL APPLICATION NO. PCT/JP99/05542

INTERNATIONAL FILING DATE: October 7, 1999

APPLICANT: Nobuyuki HISHINUMA et al.

TITLE: ULTRAVIOLET ILLUMINATION EQUIPMENT

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents

Washington, D.C. 20231

Sir:

Preliminary to calculation of the filing fee and examination of this application, please amend the above-captioned application as follows:

**In the Specification:**

Page 1, line 1, delete in its entirety;

line 2, center line in its entirety;

line 3, change heading "Field of Technology" to the headings:

--Background of the Invention

Field of the Invention--;

line 4, change "to perform" to --for--; delete "means of";

line 5, delete "means of"

line 7, change heading "Background of Technology" to the heading:

--Description of the Related Art--;

line 9, change "time; this" to --time. Such--; and

line 10, change “ashing” to --washing--.

Page 2, line 2, after “ used” insert --as the ultraviolet illumination equipment--; after “described”, insert --above.--;

line 3, delete in its entirety;

line 17, after “problems”, insert --in--; and

line 20, after “problem”, insert --in--.

Page 3, before the first line, insert the heading:

--Summary of the Invention--;

line 1, change “above; its” to --above. Its primary--;

line 5, delete in its entirety;

line 7, change “described in claim 1 is ultraviolet illumination equipment that” to --in accordance with one embodiment of the present invention--;

line 8, delete “and”;

line 9, delete “that is characterized by”;

line 10, delete “establishment of”;

line 11, delete in its entirety;

line 12, change “as described in claim 1 above, in which” to --In another embodiment of the ultraviolet illumination equipment in accordance with the present invention, --;

line 14, delete in its entirety;

line 15, change “as described in claim 2 above, in which” to --In another embodiment of the ultraviolet illumination equipment in accordance with the present invention, --;

line 17, delete in its entirety;

line 18, change “as described in claim 2 above, in which” to --In another embodiment of the ultraviolet illumination equipment in accordance with the present invention, --;

line 20, delete in its entirety;

line 21, change “as described in claim 2 above, in which” to --In another embodiment of the ultraviolet illumination equipment in accordance with the present invention, --; and

2025 RELEASE UNDER E.O. 14176

line 22, change heading “Brief Explanation of Drawings” to the heading:

--Brief Description of the Drawings--.

Page 4, line 7, change heading “Optimum Effect of Implementation of Invention” to the heading:

--Detailed Description of the Invention--;

line 8, after “illumination equipment”, insert --in accordance with one embodiment--;

line 13, change “to heat” to --for heating--; and

line 18, change “w” to --2--.

Page 5, line 1, change “figure 1” to --Figure 1--;

line 3, after “means”, insert --H--;

line 5, change “figure 2” to --Figure 2--; after “heater”, insert --H1--;

line 6, after “specifically”, insert --, is provided--;

line 11, change “figure 3” to --Figure 3--; after “microheater”, insert --H2--;

line 12, after “specifically”, insert --, is provided--; and

line 17, after “microheater”, insert --H2--.

Page 6, line 1, after “means”, insert --H--; after “thick-film heater”, insert --H1--; after “linear heater”, insert --H2--;

line 6, after “thick-film heater”, insert --H1--; change “and” to --or--; after “linear heater”, insert --H2--;

line 9, change “figure 4” to --Figure 4--;

line 11, after “bulbs”, insert --5--;

line 12, after “bulbs”, insert --5--; after “means”, insert --H--;

line 13, after “thick-film heaters”, insert --H1--; after “linear heaters”, insert --H2--;

line 19, after “window”, insert --3--; change “figure 2” to --Figure 2--; change “figure 5” to --Figure 5--; and

line 20, change “figure 5” to --Figure 5--; after “window’s”, insert --3--.

line 22, after “window”, insert --3--; change “is” to --, it--;

Page 7, line 1, after “window”, insert --3--;

lines 1 and 2, after “to the window”, insert --3--.

line 2, after “from the window”, insert --3--; after “When the window”, insert --3--;

line 3, after “window”, insert --3--;

line 4, after “window”, insert --3--;

line 5, after “window”, insert --3--;

line 6, after “window”, insert --3--;

line 9, after “window”, insert --3--;

line 10, after “window”, insert --3--;

line 15, after “thick-film heaters”, insert --H1--; change “and” to --or--; after “linear heaters”, insert --H2--; after “heating means”, insert --H--;

line 16, after “of the window”, insert --3--; after “heats the window”, insert --3--;

line 17, after “window”, insert --3--;

line 18, after “bulbs”, insert --5--; after “heating means”, insert --H--;

line 19, after “window”, insert --3--; and

lines 20-23, delete in their entirety.

Page 8, line 1, change heading “Scope of Claims” to the heading:

--Claims--; and

lines 14-20, delete in their entirety.

Page 9, lines 1-2, delete in their entirety; and

after line 3, insert the heading and text as follows:

--Abstract of the Disclosure

An ultraviolet illumination equipment including a receptacle with a window, a dielectric-barrier discharge lamp located within the receptacle for emitting ultraviolet radiation through the window, and a heater for heating the window to at least 100° C.--

**In the Claims:**

Please cancel claims 1-5.

Please add claims 6-15 as follows:

--6. An ultraviolet illumination equipment comprising:  
a receptacle with a window;  
a dielectric-barrier discharge lamp located within said receptacle for emitting ultraviolet radiation through said window of said receptacle; and  
a heating means for preventing formation and accumulation of debris on said window.

7. The ultraviolet illumination equipment of claim 6, wherein said heating means is provided within said receptacle.

8. The ultraviolet illumination equipment of claim 7, wherein said heating means is a thick-film heater positioned on a surface of said window.

9. The ultraviolet illumination equipment of claim 7, wherein said heating means is a linear heater positioned on a surface of said window.

10. The ultraviolet illumination equipment of claim 7, wherein said heating means is an incandescent bulb.

11. The ultraviolet illumination equipment of claim 10, further including a reflecting mirror adapted to transfer heat from said incandescent bulb to said window.

12. An ultraviolet illumination equipment comprising:  
a receptacle with a window;

a dielectric-barrier discharge lamp located within said receptacle for emitting ultraviolet radiation through said window of said receptacle; and

a heater to heat said window to at least 100° C.

13. The ultraviolet illumination equipment of claim 12, wherein said heater is a thick-film heater positioned on a surface of said window.

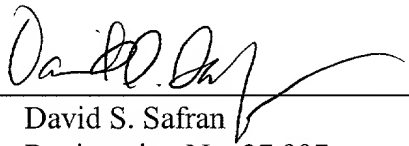
14. The ultraviolet illumination equipment of claim 12, wherein said heater a linear heater positioned on a surface of said window.

15. The ultraviolet illumination equipment of claim 12, wherein said heater is an incandescent bulb.--

REMARKS

The above amendments are made to conform the Specification and Claims of the above PCT application to U.S. patent practice and to remove the use of multiple dependencies in the national filing phase.

Respectfully submitted,

By:   
David S. Safran  
Registration No. 27,997

NIXON PEABODY LLP  
8180 Greensboro Drive  
Suite 800  
McLean, Virginia 22102  
(703) 790-9110



5/PART

- 1 -

Docket No. 0145-152

## Particulars

## Ultraviolet Illumination Equipment

## Field of Technology

This invention concerns ultraviolet illumination equipment to perform dry washing by means of ultraviolet radiation from a dielectric-barrier discharge lamp, and by means of ozone created at the same time by the ultraviolet radiation.

## Background of Technology

Technology for dry washing by means of ultraviolet illumination equipment using an ultraviolet radiation light source has been known for some time; this ultraviolet illumination equipment has been used for light ashing and precision light washing in the liquid crystal and semiconductor field.

Ultraviolet illumination equipment of this type have previously used, as the ultraviolet light source, low-pressure mercury lamps and medium pressure mercury lamps that radiate well at the ultraviolet wavelengths of 253.7 nm or 184.9 nm.

Various chemicals such as organic solvents, acids and alkalis are used when processing semiconductor or liquid crystal devices, and so these chemicals are often removed by evaporation. Among these chemicals are those that absorb ultraviolet radiation and are broken down by the energy and produce reaction products after reacting with other chemicals. For example, ammonium bisulfate  $(\text{NH}_4)\text{H}(\text{SO}_4)_2$  and ammonium sulfate  $(\text{NH}_4)_2\text{SO}_4$  are produced.

Such reaction products circulate as fine dust particles within the clean room, and when these fine dust particles accumulate, they sometimes become a factor with a deleterious effect on the manufacturing process.

On the other hand, in recent years, dielectric-barrier discharge lamps with high energy, a single wavelength and good efficiency have come to be used, in place of the mercury lamps described above, as the ultraviolet light source in ultraviolet illumination equipment.

5 In ultraviolet illumination equipment that uses a dielectric-barrier discharge lamp as the ultraviolet light source, the dielectric-barrier discharge lamp is placed in a receptacle that is sealed to separate it from the atmosphere, and the ultraviolet radiation emitted by the dielectric-barrier discharge lamp passes through a part of that receptacle to illuminate the item to be processed.

10 Nevertheless, there has been a problem in that ultraviolet illumination equipment that uses a dielectric-barrier discharge lamp has a window through which the ultraviolet radiation passes, and the reaction products mentioned above are carried by convection and adhere to this window.

15 The reason the reaction products adhere to the window is that when the dielectric-barrier discharge lamp is lit, the temperature of the front of the lamp is low, about 70°C, and so the radiant heat radiated from the lamp cannot heat the window sufficiently. Because of that, reaction products that come into contact with the window are not carried away from the window by the radiant heat, but immediately adhere to the window.

As a result, there are the problems that the transparency to ultraviolet radiation is lowered by the reaction products that adhere to the window, and the intensity of the ultraviolet radiation is not uniform throughout the area of illumination.

20 There is the further problem that processing defects and flaws appear on the item being processed, and the yield is reduced.

In cases of a considerable buildup of reaction products adhered to the window, there is a problem in that the reaction products can peel off the window as large pieces of debris, and contaminate the processing environment of the clean room.

This invention was made on the basis of the situation described above; its purpose is to provide ultraviolet illumination equipment that makes it possible to prevent reaction products due to ultraviolet radiation from adhering to the window, and thus to prevent reduction of the intensity of the ultraviolet radiation and the formation of debris from the reaction products.

5      Presentation of Invention

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In order to resolve the problems described above, the ultraviolet illumination equipment described in claim 1 is ultraviolet illumination equipment that has a dielectric-barrier discharge lamp located within a receptacle, and a window in the receptacle through which the ultraviolet radiation from the dielectric-barrier discharge lamp is emitted, and that is characterized by establishment of a heating means to heat the window to at least 100°C.

The ultraviolet illumination equipment described in claim 2 is ultraviolet illumination equipment as described in claim 1 above, in which the heating means is established within the ultraviolet illumination equipment.

The ultraviolet illumination equipment described in claim 3 is ultraviolet illumination equipment as described in claim 2 above, in which the heating means is a thick-film heater formed on the surface of the window.

The ultraviolet illumination equipment described in claim 4 is ultraviolet illumination equipment as described in claim 2 above, in which the heating means is a linear heater formed on the surface of the window.

20      The ultraviolet illumination equipment described in claim 5 is ultraviolet illumination equipment as described in claim 2 above, in which the heating means is an incandescent bulb.

Brief Explanation of Drawings

Figure 1 is an explanatory drawing of the ultraviolet illumination equipment of this invention.

Figure 2 is an explanatory drawing of a window using a thick-film heater as the heating means.

Figure 3 is an explanatory drawing of a window using a microheater as the heating means.

Figure 4 is an explanatory drawing of a window using incandescent bulbs as the heating means.

- 5 Figure 5 is experimental data showing the change, due to the temperature of the window, in transparency to ultraviolet radiation caused by the adherence of radiation products.

#### Optimum Effect of Implementation of Invention

Figure 1 is an explanatory drawing of the ultraviolet illumination equipment of this invention.

10 Within a receptacle 1 made of stainless steel, there are a number of dielectric-barrier discharge lamps 2 that emit ultraviolet radiation. There is a window 3 made of quartz glass to be transparent to ultraviolet radiation on the front of the receptacle 1.

On the inner surface of the window 3 of the ultraviolet illumination equipment is formed a heating means H to heat the window 3 to at least 100°C. Now, the heating means H will be explained in detail hereafter.

- 15 The receptacle 1 is sealed closed, and the dielectric-barrier discharge lamps 2 are separated from the atmosphere. The receptacle 1 is sealed with a gas, such as nitrogen, argon or neon, whose transparency is inactive with regard to the light emitted by the dielectric-barrier discharge lamps 2.

The dielectric-barrier discharge lamps w are filled with xenon at 250 Torr as a discharge gas. The input power is 0.2 W per square centimeter of sight emitting area, and ultraviolet radiation with a maximum wavelength of 172 nm is emitted efficiently.

20

In figure 1, 4 is a reflecting mirror that efficiently reflects the ultraviolet radiation emitted by the dielectric-barrier discharge lamps 2 toward the window.

The heating means is explained next.

<Heating means 1>

5 As shown in figure 2, a thick-film heater is formed within the ultraviolet illumination equipment, and specifically on the surface of the dielectric-barrier discharge lamp side of the window 3.

This thick-film heater H1 is a conductive, heat-generating paste that is screen printed onto the window 3, then baked for 30 minutes at 500°C.

Now, the amount of heat produced by this thick-film heater H2 is 1.9 kW.

10 <Heating means 2>

As shown in figure 3, a microheater, which is a linear heater, is formed within the ultraviolet illumination equipment, and specifically on the surface of the dielectric-barrier discharge lamp side of the window 3.

15 This microheater is a fine tube of stainless steel with a nicrome wire running along the center of the tube as a heating element, the space between the tube and the wire being filled with high-grade powdered magnesium. It is a bendable heater.

Now, this microheater is 1.6 mm in diameter and 40 m in length; the amount of heat produced is 4 kW.

The reason that these heating means, the thick-film heater and the linear heater, are formed within the ultraviolet illumination equipment, and specifically on the surface of the dielectric-barrier discharge lamp side of the window 3 is this: to prevent deterioration of the heaters by preventing direct contact of the heaters with the gases and vapors produced during processing of the item being processed, and to keep the heaters from casting a shadow on points directly below the heaters.

Moreover, by forming the thick-film heater and the linear heater directly on the surface of the window 3, it is possible to heat the window 3 more efficiently.

<Heating means 3>

As shown in figure 4, incandescent halogen bulbs 5 are placed between the dielectric-barrier discharge lamps 2, within the receptacle 1.

In this case, the window 3 is heated by the infrared radiation from the incandescent bulbs.

When incandescent bulbs are used as the heating means in this way, the structure of the ultraviolet illumination equipment is simpler than with thick-film heaters or linear heaters, and there is no obstruction at all of ultraviolet radiation passing through the window. Therefore, the uniformity of intensity of the ultraviolet radiation emitted is even better.

Now in this implementation, the incandescent bulbs were 500 W, 25 A halogen lamps sealed on both ends.

Next, experimentation was done to investigate the amount of adhered material relative to the temperature of the window, using the ultraviolet illumination equipment shown in figure 1 with a thick-film heater on the window, as shown in figure 2. The results are shown in figure 5.

In figure 5, the vertical scale shows the window's transparency to light with a wavelength of 172 nm. As the temperature of the window rose, the transparency increased. From that fact it was known that

as the temperature of the window became higher, the reaction products which had adhered to the window began to break up and separate from the window. When the window was at 100°C, reaction products that even approached the window were broken up by its radiant heat, and none adhered to the window.

- 5 As was learned from these results, heating the window to at least 100°C made it possible to prevent the reaction products from adhering to the window, to prevent a reduction in the intensity of ultraviolet radiation, and to prevent the formation of debris from reaction products.

10 As explained above, the ultraviolet illumination equipment of this invention uses a heating means to heat the window to at least 100°C, and so it is possible to prevent the reaction products of organic solvents, acids, alkalis or other chemicals, due to ultraviolet radiation, from adhering to the window, and it is possible to prevent the formation of debris from the reaction products.

15 Moreover, because the heating means is established within the ultraviolet illumination equipment, it does not undergo deterioration from contact with organic solvents, acids, alkalis or other chemicals.

20 Because the thick-film heaters and linear heaters used as heating means are formed directly on the surface of the window, the heat generated by these heaters heats the window directly, and so it is possible to heat the window efficiently.

Using incandescent bulbs as the heating means simplifies manufacturing and further improves the uniformity of ultraviolet radiation intensity, in addition to heating the window.

## 20 Field of Industrial Use

This invention can be used as ultraviolet illumination equipment for dry washing by means of the ultraviolet radiation emitted by the dielectric-barrier discharge lamp and simultaneously by means of the ozone produced by that ultraviolet radiation.

## Scope of Claims

1. Ultraviolet illumination equipment that has a dielectric-barrier discharge lamp located within a receptacle, and a window in the receptacle through which the ultraviolet radiation from the dielectric-barrier discharge lamp is emitted, and that is characterized by establishment of a heating means to heat the window to at least 100°C.

2. Ultraviolet illumination equipment as described in claim 1 above, in which the heating means is established within the ultraviolet illumination equipment.

3. Ultraviolet illumination equipment as described in claim 2 above, in which the heating means is a thick-film heater formed on the surface of the window.

4. Ultraviolet illumination equipment as described in claim 2 above, in which the heating means is a linear heater formed on the surface of the window.

5. Ultraviolet illumination equipment as described in claim 2 above, in which the heating means is an incandescent bulb.

## Summation

This invention is to prevent reaction products due to ultraviolet radiation from adhering to the window, to prevent reduction of the intensity of the ultraviolet radiation, and to prevent the formation of debris from the reaction products.

## Presentation of Invention

Ultraviolet illumination equipment that has a dielectric-barrier discharge lamp 2 located within a receptacle 1, and a window 3 in the receptacle 1 through which the ultraviolet radiation from the



dielectric-barrier discharge lamp 2 is emitted, and that is characterized by establishment of a heating means to heat the window 3 to at least 100°C.

Approved for Release 2001/06/06 : CIA-RDP80-01060A000100010001-6

FIG. 1

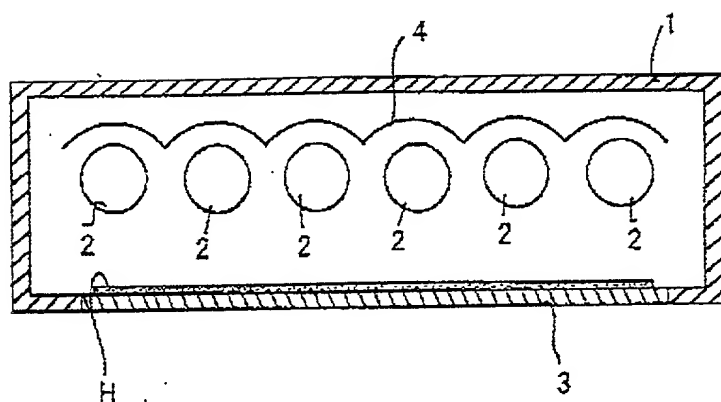


FIG. 2

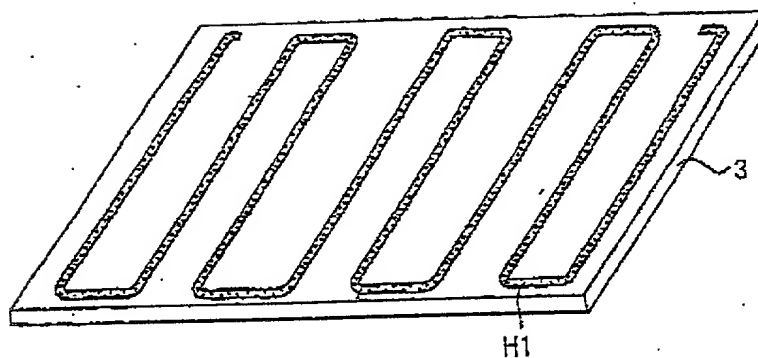


FIG. 3

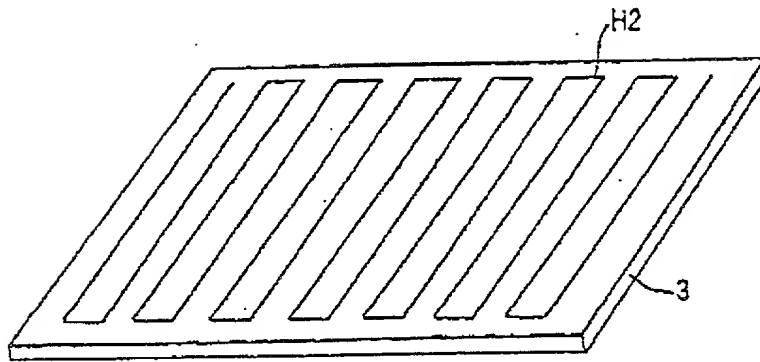


FIG. 3

FIG. 4

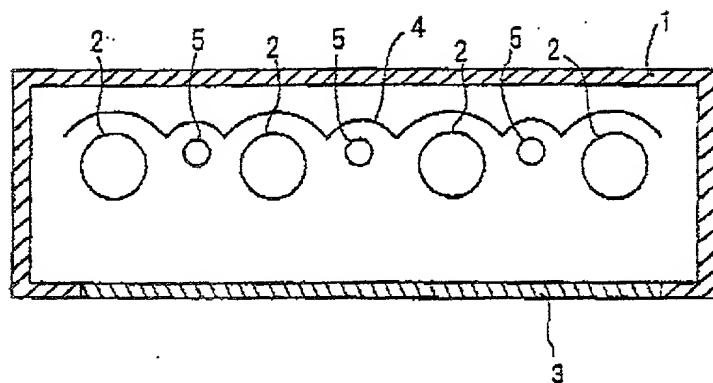
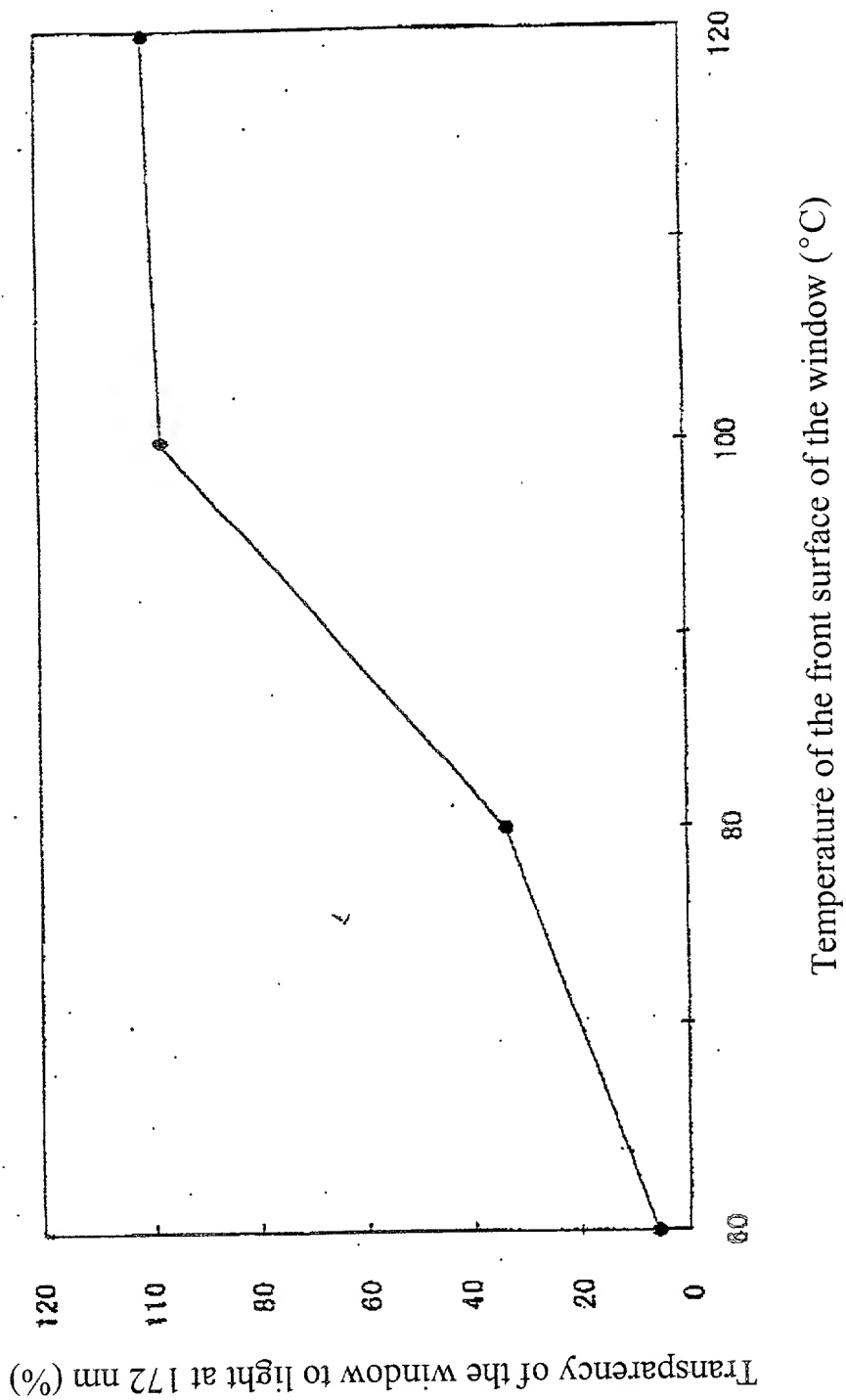


FIG. 4

FIG. 5



第三共同発明者		3rd Full name of third joint inventor, if any Fumitosho TAKEMOTO	
発明者の署名	日付	Inventor's signature Fumitosho Takemoto	Date 4/24/00
住所		Residence Himeji-shi, Japan	JPX
国籍		Citizenship Japanese	
〒番地		Post Office Address 3-12-3, Shinzaikohonmachi	
		Himeji-shi, Hyogo, Japan	
第四共同発明者		4th Full name of fourth joint inventor, if any Hiroaki TOKAI	
発明者の署名	日付	Inventor's signature Hiroaki Tokai	Date 4/26/00
住所		Residence Himeji-shi, Japan	JPX
国籍		Citizenship Japanese	
〒番地		Post Office Address 219-1, Mikuninochofukashino	
		Himeji-shi, Hyogo, Japan	

第五共同発明者		5th Full name of fifth joint inventor, if any Jun MURASE	
発明者の署名	日付	Inventor's signature Jun Murase	Date 4/25/00
住所		Residence Himeji-shi, Japan	JPX
国籍		Citizenship Japanese	
〒番地		Post Office Address 13-2, Hinodecho 2-chome,	
		Himeji-shi, Hyogo, Japan	
第六共同発明者		6th Full name of sixth joint inventor, if any	
発明者の署名	日付	Inventor's signature	Date
住所		Residence	
国籍		Citizenship	
〒番地		Post Office Address	

(第五以上の共同発明者についても同様に記載し、署名を要すること)

(Supply similar information and signature for fifth and subsequent joint inventors.)

**Japanese Language Declaration**  
 (日本語宣言書)

特許代理人: 以下に記述の発明者として、本出願に添付する一切の  
 手続を本特許事務所を通じて送付する弁護士または代理人  
 として、下記の名を掲げたいします。(弁護士、または代理人  
 の氏名及び登録番号を明記してください)

Daniel W. Stube (Reg. No. 20,922)  
 David S. Safran (27,997)  
 Jeffrey L. Coshell (Reg. No. 35,411)  
 Robert M. Schulman (Reg. No. 31,186)  
 Marc S. Kaufman (Reg. No. 35,212)

Susan J. Friedman (Reg. No. 24,312)  
 Thomas W. Cole (Reg. No. 28,290)  
 Tim L. Brevard, Jr. (Reg. No. 36,002)  
 Thomas M. Blasey (Reg. No. 31,475)  
 William J. Healey (Reg. No. 38,160)

POWER OF ATTORNEY: As a named inventor, I hereby appoint  
 the following attorney(s) and/or agent(s) to prosecute this  
 application and transact all business in the Patent and Trademark  
 Office connected therewith (list name and registration number)

Charles M. Loomis, Jr. (Reg. No. 28,477)  
 Donald R. Stodolnik (Reg. No. 32,815)  
 Eric J. Robinson (Reg. No. 38,285)  
 Daniel S. Song (Reg. No. 49,145)

Send Correspondence to:

**NIXON PEABODY LLP**  
 8180 Greensboro Drive, Suite 800  
 McLean, Virginia 22102

**NIXON PEABODY LLP**  
 8180 Greensboro Drive, Suite 800  
 McLean, Virginia 22102

直接電話連絡先: (名前及び電話番号)

Direct Telephone Calls to: (Name and telephone number)

David S. Safran (703) 790-9110

David S. Safran (703) 790-9110

第一または第一発明者名	Full name of sole or first inventor	<b>NOBUYUKI HISETNUNA</b>
発明者の署名	Signature	<i>NOBUYUKI HISETNUNA</i> Date <b>4/27/00</b>
住所	Residence	<b>Himeji-shi, Japan</b> JPX
国籍	Citizenship	<b>Japanese</b>
事務所	Post Office Address	<b>6-7-2, Kitahirano, Himeji-shi, Hyogo, Japan</b>
第二発明者名	Full name of second joint inventor, if any	<b>HIROSHI SUGAWARA</b>
第二発明者の署名	Signature	<i>HIROSHI SUGAWARA</i> Date <b>4/26/00</b>
住所	Residence	<b>Himeji-shi, Japan</b> JPX
国籍	Citizenship	<b>Japanese</b>
事務所	Post Office Address	<b>2-11-704, Jounancho, Shikama-ku, Himeji-shi, Hyogo, Japan</b>

(第三以降の発明者名についても同様に記載し、署名する  
 こと)

(Supply similar information and signature for third and subsequent  
 joint inventors.)

Prepared

☒ Please see attached page 3a for names, addresses and signatures  
 of additional inventors, if any.



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## Declaration and Power of Attorney For Patent Application

### 特許出願宣言書及び委任状

### Japanese Language Declaration

### 日本語宣言書

下記の氏名を発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

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EQUIPMENT

上記発明の明細書（下記の欄でX印がついていない場合は、本表に添付）は、

the specification of which is attached hereto unless the following box is checked:

☐ 月 日に提出され、米国出願番号または特許協定条約国際出願番号を \_\_\_\_\_ とし、  
（該当する場合） \_\_\_\_\_ に訂正されました。

☒ was filed on October 7, 1999  
as United States Application Number or  
PCT International Application Number  
PCT/JP99/05542 and was amended on \_\_\_\_\_  
(if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、著作権法第37条第1条第5項に定まられるとおり、特許資格の有無について重要な情報を開示する義務があることを認めます。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

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私は、米国法典第35編119条(a)-(d)項又は365条(b)項に基き下記の、米国外の国の少なくとも一カ国を指定している特許協力条約365(a)項に基き国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、不出願の前に出願された特許または発明者証の外国出願を以て、枠内をマークすることで、示しています。

#### Prior Foreign Application(s) 外国での先行出願

(Number) (番号)	(Country) (国名)
(Number) (番号)	(Country) (国名)

我々、第35編米国法典119条(e)項に基いて下記の米  
国特許出願規定に記載された権利をここに主張いたします。

(Application No.) (出願番号)	(Filing Date) (出願日)
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国特許出願に記載された権利、又は米国を指定している特許  
協力条約365条(c)に基き権利をここに主張します。ま  
た、本出願の各請求範囲の内容が米国法典第35編112条  
第1項又は特許協力条約で規定された方法で先行する米国特  
許出願に開示されていない限り、その先行米国出願書提出日  
以降で不出願書の日本国内または特許協力条約国際提出日ま  
での期間中に入手された、連邦規則法典第37編1条56項  
で定義された特許資料の有無に関する重要な情報について開  
示義務があることを認識しています。

(Application No.) (出願番号)	(Filing Date) (出願日)
(Application No.) (出願番号)	(Filing Date) (出願日)

私は、私自身の知識に基き本宣言書中で私が行なう表  
明が真実であり、かつ私の入手した情報と私の信じるところ  
に基き表明が全て真実であると信じていること、さらに故  
意になされた虚偽の表明及びそれと同等の行為は米国法典第  
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の有効性が失われることを認識し、よってここに上記のごと  
く宣誓を致します。

I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box. Any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Priority Not Claimed  
優先権主張なし

(Day/Month/Year Filed) (出願年月日)
(Day/Month/Year Filed) (出願年月日)

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(Application No.) (出願番号)	(Filing Date) (出願日)
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I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of application.

(Status: Patented, Pending, Abandoned) (現況: 特許許可済、係属中、放棄済)
(Status: Patented, Pending, Abandoned) (現況: 特許許可済、係属中、放棄済)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.